C) AMENDMENTS TO THE CLAIMS

Please cancel claims 11 – 22, 24-26, 28-31, 33-35, 42 and 43 without prejudice and amend claims 23, 27 and 32 as follows.

Listing of claims:

11 – 22, 24-26, 28-31, 33-35, 42 and 43 [Cancelled]

23. [Currently Amended] A second-phase photonic integrated circuit comprising

a photonic integrated circuit, the photonic integrated circuit comprising:

an input/output interface arranged on a substrate comprising a plurality of waveguides for simultaneously inputting at least one signal to and outputting at least one signal from the photonic integrated circuit for demultiplexing a multiplexed optical signal in to n different constituent wavelengths and for combining n input optical signals composed of n different constituent wavelengths in to a multiplexed signal;

a slab waveguide arranged on the substrate having a first end and a second end, the first end coupled to the plurality of waveguides of the input/output interface to focus the at least one input signal to the second end, and the second end coupled to an array waveguide, for focusing the at least one output signal to the input/output interface through the first end;

the array waveguide arranged on the substrate comprising a plurality of waveguides for coupling the one or more input signals, separating the one or more input signals into the n different constituent wavelengths and focusing the n different constituent wavelengths back on to the slab waveguide first end coupling to the input/output interface, the plurality of waveguides of the array waveguide being optically coupled at one end with the second end of the slab waveguide, and terminated at an opposing end of the array waveguide by a reflective mirror, each waveguide of said array waveguide having a predetermined path difference between successive waveguides; and

the reflective mirror integrally disposed and formed along an edge of the integrated circuit at the opposing end of the array waveguide for reflecting the one or more signals incident on it from the array waveguide back into the array waveguide;

and an active unit formed on the substrate, the active unit connected to the photonic integrated circuit by a waveguide interconnect means,

wherein the amplifier block is comprised of a material that absorbs light in the 890 nanometer and the 1480 nanometer regions and emits light in the 1310 nanometer and 1550 nanometer regions.

27. [Currently Amended] The second-phase photonic integrated circuit as set forth in claim 23 [[26]], wherein the amplifier block material is selected from one of the following: erbium doped dendrimer or glass.

32. [Currently Amended] [[The]] A second-phase photonic integrated circuit ~~as set forth in claim 29~~ comprising:

a photonic integrated circuit, the photonic integrated circuit comprising:

an input/output interface arranged on a substrate comprising a plurality of waveguides for simultaneously inputting at least one signal to and outputting at least one signal from the photonic integrated circuit for demultiplexing a multiplexed optical signal in to n different constituent wavelengths and for combining n input optical signals composed of n different constituent wavelengths in to a multiplexed signal;

a slab waveguide arranged on the substrate having a first end and a second end, the first end coupled to the plurality of waveguides of the input/output interface to focus the at least one input signal to the second end, and the second end coupled to an array waveguide, for focusing the at least one output signal to the input/output interface through the first end;

the array waveguide arranged on the substrate comprising a plurality of waveguides for coupling the one or more input signals, separating the one or more input signals into the n different constituent wavelengths and focusing the n different constituent wavelengths back on to the slab waveguide first end coupling to the input/output interface, the plurality of waveguides of the array waveguide being optically coupled at one end with the second end of the slab waveguide, and terminated at an opposing end of the array waveguide by a reflective mirror, each waveguide of said array waveguide having a predetermined path difference between successive waveguides; and

the reflective mirror integrally disposed and formed along an edge of the integrated circuit at the opposing end of the array waveguide for reflecting the one or more signals incident on it from the array waveguide back into the array waveguide;

and an active unit formed on the substrate, the active unit connected to the photonic integrated circuit by a waveguide interconnect means,

a signal processing unit coupled to the photonic integrated circuit for electro-optically processing the input and output signals,

wherein the signal processing unit is a modulator block;

wherein the modulator block is connected to the photonic integrated circuit through a first waveguide interconnect, and the photonic integrated circuit is connected to the active unit through a second waveguide interconnect.